

Scout Skills

Lamps

info

Scout
Information
Centre

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Despite the large number of different types of lamps on the market, generally speaking they will be one of two types. The fuel supply will either be held in a self-contained cylinder or canister that is replaced once it is emptied or the lamp will have a fuel tank that you refill as necessary.

All lamps burn fuel in order to heat a 'mantle' which gives off light. The mantle is very fragile - essentially it is made of ash and is easily damaged if it is poked with a match during lighting or is vibrated during transit.

Cylinder lamps - The lamps that have fuel cylinders tend to use either butane gas (blue cylinders) or propane gas (red cylinders). The fuel in the cylinder comes in both liquid and gaseous forms. You can hear the liquid slopping about if you shake the cylinder. The liquid fuel turns to gaseous fuel as the pressure in the cylinder reduces, that is, as you use up the fuel. So a full cylinder contains a lot of liquid and feels heavier than one that is nearly empty.

The gas can be carried to the burner by a pipe. This is usual with propane and the gas supply is controlled with a valve or tap. All gas lanterns are lit easily - just apply a match and turn on the gas - but take care not to damage the mantle and be sure to turn off the gas supply fully when the lamp is not in use.

Other gas lanterns consist of a sealed canister of fuel which is either screwed or clamped to the burner holding the mantle. The act of screwing on the canister or pushing it into the clamped position punctures the canister and the gas flow is then controlled by a valve.

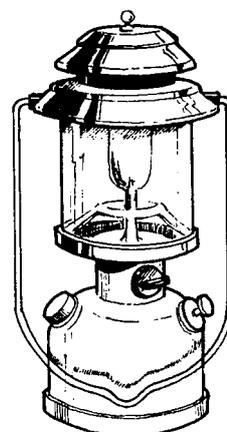
Most accidents with this type of lamp occur when the fuel cylinder is changed. There are some simple rules, often printed as instructions on the gas cylinder or provided as separate written instructions with a new lamp.

When changing a cylinder, remember:

- To fully close the gas supply valve.

- To allow the lamp to cool; There is going to be some escape of gas as the empty cylinder is removed because they are never completely empty;
- To always change the cylinder outside in the open air. There is then no chance of filling a confined space, such as a tent, with highly flammable vapours.
- To ensure that the empty cylinder is left outside and is disposed of during daylight. This is because the rate of evaporation of liquid into gas form depends on the temperature. If it is a very cold night, some fuel may remain in liquid form in the cylinder. This will evaporate to gas as the temperature rises and because the gas is heavier than air, disposing of a nearly empty container into a plastic bag or metal dustbin might result in a build up of gas during warmer weather. A discarded cigarette or other spark could have disastrous consequences.

Another good reason for changing the cylinder outside is that, in an extreme case, the new full cylinder might be punctured but will not clamp to the burner housing. A stream of liquid and gas will rapidly escape and will quickly fill any enclosed space with an explosive atmosphere. The smallest spark will cause a catastrophe. Should the escaping stream of liquid gas catch fire, the effect is rather like a blow torch.



Pressure lamps - The second type of lamp, called 'pressure lamps', uses a liquid fuel which is vaporised and then burned in the same way as a gas lantern. The liquid fuel can be petrol or paraffin.

The fuel is held in a tank at the bottom of the lamp. The normal method of lighting is to place a wick soaked in methylated spirits around the fuel supply column above the tank but below the mantle. Once lit, this wick heats the fuel supply column. With the valve on the column turned off to exclude fuel, the fuel tank is pressurised with a hand pump.

Once the column is hot enough, the fuel supply is switched on and the liquid fuel passes up the central column. If the pipe is hot enough, the liquid will be vaporised and on entering the mantle, will catch alight from the flame of the burning wick. The wick can then be taken away and extinguished.

A common problem is that the fuel supply is turned on too soon and instead of vapour, liquid fuel enters the mantle and catches fire. In this case, you get a lot of flame but not much light! Don't panic - just turn off the fuel supply and the flame will die down. But this is a very good reason for not lighting a lantern in a tent!

If this does happen, wait a little longer until the column has further heated and then try again. Once the lamp is lit, pump more air into the tank until the light being given off is at its maximum level.

Tricks of the trade

- a) For gas lamps, remember that the rate of evaporation of liquid fuel to gas form depends on temperature. Therefore, this type of lamp (and stove) will be less efficient in very cold weather - just when you might need them on an expedition! In fact, butane (blue cylinder) does not light below a temperature of about minus one degree centigrade, therefore on winter expeditions, propane should be used. Better still, take a pressure lamp and stove.
- b) For all lamps, practise changing a mantle in the comfort of your own headquarters. The last place to try it for the first time is in the dark on a strange camp site. Mantles vary depending on the type of lamp. Once the new mantle is tied in position, set fire to it

with a match and allow it to burn out completely. The lamp is then ready to light.

Resources

Manufacturers' catalogues are available from suppliers such as Camping and Outdoor Centres.

When you purchase a new lamp, take care to keep the instruction sheet in a safe place. It is worth copying the original instruction sheet, leaving the copy always available with the lamp. If the copy is lost or damaged, the master copy can be used to ensure that instructions are always available with the lamp.

TEACH YOURSELF

Anyone who has suffered a power cut at home on a dark winter evening will know that life becomes very difficult without light! Lamps are as important as tents and stoves in the camp situation. It is important to know how to light them quickly and safely and how to look after them so that they are always in working condition.

Before having a go, it is important to read the Information Sheet if you have not already done so.

Time

You can learn all you need to know about lamps in as little as 45 minutes.

Equipment

You will need various types of lamp, especially those in common use in your Troop. Try and get hold of a butane gas (blue cylinder) lamp and a pressure lamp (petrol or paraffin) as a minimum.

You will also need matches, spare mantles, fuel supplies, including replacement gas cylinders, and any small tools supplied with your lamps for maintenance purposes.

Safety precautions

Handling flammable materials involves an element of risk.

Always:

- Work well away from naked flames including other lamps, stoves and fires.
- Work in the open air or in a well ventilated space.
- Wipe up any fuel spillages immediately and dispose of soiled material carefully - it's no use placing a petrol soaked rag in a waste paper bin!
- When refuelling petrol or paraffin lamps, ensure that the lamp is properly cooled. You can't see vaporised fuel - it will form in pockets where you least expect it, just waiting for a spark.

- Seal fuel in screw top containers at all times when not in use. Not only is there danger of massive spillage if your one gallon can of petrol is not sealed, but on a warm day, flammable vapours are being given off all the time. Therefore, when at camp, fuel should also be stowed in the shade.
- Use only the correct fuel for the lamp being used. Never mix fuels.
- Take care never to put empty gas cylinders on a fire and keep them away from heat.
- Check that the lamp you are using is stable and cannot fall over.



LEARNING ALL ABOUT IT

1. Before lighting

Start by checking fuel supply. For petrol, paraffin and gas lamps you can hear fuel sloshing around if you give the lamp a gentle shake. For gas lamps, you could also open the gas supply valve and listen for the hiss of escaping gas. Top up the fuel supply as necessary and, if changing a gas cylinder, remember the safety 'rules'. (See under Cylinder lamps in the Information Sheet.)

Visually inspect the mantle and glass globe. A damaged mantle will emit less light and makes the lamp inefficient. It is a good idea to practise changing a mantle. Refer to the manufacturer's instructions and/or the Information Sheet. The steps will probably be as follows:

- Remove the top of the lamp, including the glass globe. Now is a good time to inspect the globe for cracks and to clean it with a solution of household detergent.

- Remove the damaged mantle. The ash body can be brushed away with the fingers but make sure to remove the ties at the top and bottom of the mantle. These are usually located in grooves or behind ridges on the fuel supply column.
- Unpack the replacement mantle, ensuring that you have the correct mantle for your type of lamp. The mantle looks like a multi-coloured 'tea bag' except that it has two holes. The larger hole is offered to the fuel supply column first and pulled down until the tie can be laid in a groove or behind the ridge on the fuel supply column. Make fast. The upper hole is adjacent to the appropriate ridge. The mantle now looks huge!
- With the gas supply turned off, apply a lighted match and allow the mantle to burn completely. It shrinks as it burns, usually turning a greyish-white colour.
- Carefully reassemble the lamp.

2. Lighting

- a) *Gas lamps* - The base plate below the glass globe has holes through which a match or taper can be passed to reach the mantle. To light a gas lamp, simply apply a lighted taper through one of the base plate holes and gently turn on the gas. As the globe fills with gas, it will ignite with a soft 'plop' noise and the mantle will begin to glow. The amount of light is adjusted with the fuel supply valve.
- b) *Pressure lamps* - As described in the Information Sheet, to supply the lighting these lamps rely on the fuel column being pre-heated, so that fuel is vaporised as it enters the mantle., Refer to the manufacturer's instructions which will probably state:
 - Ensure that the fuel supply valve is closed.
 - Place a rag soaked in methylated spirits in the container on the fuel supply column and light.
 - Wait at least 30 seconds, then pump up the fuel cylinder/container via the hand pump. (The number of strokes will be stated.)
 - Open the fuel supply valve.
 - When the mantle is lit, pump the fuel cylinder as necessary to maintain pressure.

Again the amount of light is adjusted via the fuel supply valve.

3. Maintenance

Practise refuelling pressure lamps and changing the gas cylinder on a gas lamp. Follow the

safety rules at all times - as this is the most dangerous aspect of all lamps!

To change a gas cylinder on a gas lamp, the lamp must be dismantled. The steps are very simple and are as follows:

- Unscrew the top portion of the lamp. Any residual gas will escape at this time because the unscrewing action retracts the puncture device from the cylinder. The gas cylinder housing and the top portion of the lamp are now separated. On the bottom of the gas cylinder housing is a plate which, when turned, allows the empty gas cylinder to fall out.
- The replacement gas cylinder is placed in the housing and the base plate is screwed back into position.
- Making sure that the fuel supply valve is closed, the top portion of the lamp is then screwed into place. This automatically punctures the gas cylinder seal and once tightened, the lamp is leak proof and ready for use.

Note:

Most accidents in replacing a gas cylinder occur because this simple procedure is not followed. If the top of the lamp is left screwed into the gas cylinder housing, then as the new cylinder is offered up to the housing and pressed into place, the cylinder is punctured and gas begins to escape. In trying to clamp or screw the base plate in position, you are fighting against the pressure of the gas release from the cylinder as well as normal friction. This is obviously a dangerous situation.

One final tip. When you use a lamp at camp, it is a wise precaution to light the lamp before night settles. Should you have any difficulty or repair work to do, this is much easier in the daylight, and again, it's safer for the work to be done outside.

Can you do it?

When you feel confident about lamps, check how you are doing and see which of the following you can tick off:

Light a gas lamp

Light a pressure lamp

Change the mantle on a gas lamp

Change the gas cylinder on a butane gas lamp

Refuel a petrol pressure lamp

List the safety precautions with lamps and their fuel

So you want more?

Maintain a pressure lamp, including inspection and replacement of seals as necessary;

Practise with different types and makes of lamps;

Talk to another Leader in your Group or District about lamps.

Your notes on this session

HOW TO TRAIN OTHERS

This section is designed to give some practical ideas about how you can help other people to understand about the safe use of lamps. This might be 'Leaders or Scouts - either in an informal way on a Troop night or more formally on a skills workshop, training course or something similar.

Objectives

By the end of this session, participants will be able to:

- I. Identify the parts of a gas lamp and a pressure lamp;
- II. Demonstrate the correct way to change a gas cylinder;
- III. Demonstrate the correct way to change a mantle;
- IV. Demonstrate how to light a gas lamp and a pressure lamp;
- V. State the safety precautions involved with lamps and their fuel;
- VI. State the maintenance features of various types of lamp.

Time

One hour approximately.

Equipment

Various types of lamp, including a gas lamp with an empty cylinder. A further empty gas cylinder will be necessary to practise changing cylinders.

Spare mantles and matches. If you are demonstrating the flammability of neat paraffin, methylated spirits and petrol, some old rags, an empty tin can, Scout staves or garden canes and tapers for lighting. Any items that might be required for the training games (see overleaf).

Training methods

This is essentially a practical session which will require demonstration and personal hands-on practice. However, it is important to start with the safety precautions, especially those relating to the flammability of the fuels in use, and to

highlight the potential danger when dealing with lamps and fuels.

If you are brave enough, the following demonstration has quite an impact, but please take care and explain to those watching (from a safe distance!) that this is only a demonstration and not to be attempted by just anyone!

- Take an empty tin can and place a small quantity of paraffin in the bottom of the can. A few millilitres is all that is required. You can demonstrate that paraffin is fairly safe by throwing matches into the can. They will extinguish on hitting the surface of the paraffin. However, if the paraffin is now poured out of the can onto a rag, and a match is thrown onto the rag, the effect is clearly seen.
- Next, place the empty tin can upside down and using the small lip at the top (unopened end), pour a little petrol onto the top of the can. Soak it up with a paper tissue, ensuring that all the liquid is picked up and then invert the can and place the paper tissue loosely inside the can. Use a lighted taper attached to the end of a stave or short garden cane and apply the light to the top of the tin can. A small explosion occurs and the paper tissue will often be ejected as a flaming ball!
- The volatility of methylated spirits can be demonstrated in a similar fashion.

Alternatively, with a very small quantity in the top lip (unopened end) of a tin can, again apply a lighted taper via a stave or garden cane and watch the ignition!

- You can safely demonstrate the dangers associated with a butane gas cylinder which contains both liquid and gas. Remove the mantle from a gas lamp along with the glass globe. Using a lighted candle as the ignition source, point the exit of the gas supply tube at the candle flame and open the gas supply valve. A blow torch effect results. This is exactly what would happen if a punctured gas cylinder was allowed near any naked lights, spark or cigarette.

Stress that all these dangers can be eliminated by the safe handling of fuel and lamps.

Empty gas cylinders can be used to practise dismantling a gas lamp in order to change the gas cylinder.

To practise changing mantles, use a new mantle and tie it into position, but do not set fire to it.

Rather, it should be removed and the next participant allowed to try. As a final operation, demonstrate setting fire to the mantle, allowing it to shrink and then demonstrate lighting the gas lamp, once the top of the lamp has been reassembled.

Note:

Some participants may be apprehensive about applying a match to a glass container which they are about to fill with gas! Demonstrate that this is not a dangerous activity if done properly.

Demonstrate the correct way to light a pressure lamp. Pay particular attention to the storage of methylated spirits and petrol/paraffin containers which are not in use. Again, there may be apprehension about applying a match to petrol vapour!

Take apart a pressure lamp, showing the various seals. Allow participants to reassemble and dismantle lamps as necessary.

Stress that in carrying all types of pressure lamps to and from camp, it is good advice to empty all fuel.

Training games

1. Copy the Safety Precautions from the 'Teach Yourself' section. Cut them up into individual words or groups of words and ask participants to reassemble the jigsaw to build the list of safety precautions.
2. Using an empty gas cylinder, dismantle a gas lamp completely. Ask blindfolded participants to reassemble the lamp, including the fitting of a new mantle. A variation on this game might be where small groups of people form teams and give instructions to one blindfolded member.
3. Devise a wordsearch containing all the relevant components of a pressure lamp.

Checking their progress

Ask participants whether they feel happy with their ability to:

Light a gas lamp

Light a pressure lamp

Change the mantle on a gas lamp

Change the gas cylinder on a butane gas lamp

Re-fuel a petrol pressure lamp

List the safety precautions for lamps and their fuel

So they want to learn more?

Obtain catalogues from manufacturers and investigate the different types of lamps and lanterns available.

Your notes on this session